Michigan **High School**

FlyBy Math^{TM} Alignment
Michigan Mathematics
Content Standards and Working Draft Benchmarks

Strand I. Patterns, Relationships and Functions

Content Standard 1: Students recognize similarities and generalize patterns, use patterns to create models and make predictions, describe the nature of patterns and relationships, and construct representations of mathematical relationships. (Patterns)

Benchmark	*FlyBy Math*^{TM} **Activities**
2. Analyze, interpret and translate among representations of patterns including tables, charts, graphs, matrices and vectors.	--Represent distance, speed, and time relationship for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system. --Use tables, bar graphs, line graphs, equations, and a Cartesian coordinate system to draw conclusions.
3. Study and employ mathematical models of patterns to make inferences, predictions and decisions.	--Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.
5. Use patterns and reasoning to solve problems and explore new content.	--Apply mathematics to predict and analyze aircraft conflicts and validate through experimentation.

Content Standard 2: Students describe the relationships among variables, predict what will happen to one variable as another variable is changed, analyze natural variation and sources of variability, and compare patterns of change. (Variability and Change)

Benchmark	*FlyBy Math*^{TM} **Activities**
1. Identify and describe the nature of change and begin to use the more formal language such as rate of change, continuity, limit, distribution and deviation.	--Use graphs to compare airspace scenarios for both the same and different starting conditions and the same and different constant (fixed) rates.
2. Develop a mathematical concept of function and recognize that functions display characteristic patterns of change (e.g., linear, quadratic, exponential).	--Represent distance, speed, and time relationship for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system.
6. Increase their use of functions and mathematical models to solve problems in context.	--Choose among tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.

Strand II. Geometry and Measurement

Content Standard 2: Students identify locations of objects, identify location relative to other objects, and describe the effects of transformations (e.g., sliding, flipping, turning, enlarging, reducing) on an object. (Position)

Benchmark	*FlyBy Math*TM Activities
5. Use concepts of position, direction and orientation to describe the physical world and to solve problems.	--Explain and justify solutions regarding the motion of two airplanes using the results of plotting points on a schematic of a jet route, on a vertical line graph, and on a Cartesian coordinate system.

Content Standard 3: Students compare attributes of two objects, or of one object with a standard (unit), and analyze situations to determine what measurement(s) should be made and to what level of precision. (Measurement)

Benchmark	*FlyBy Math*TM Activities
2. Continue to make and apply measurements of length, mass (weight), time, temperature, area, volume, angle; classify objects according to their dimensions.	--Calculate and measure the position and time of simulated aircraft. Represent that motion using tables, graphs, equations, and experimentation.
5. Use proportional reasoning and indirect measurements, including applications of trigonometric ratios, to measure inaccessible distances and to determine derived measures such as density.	--Use graphs to compare airspace scenarios for both the same and different starting conditions and the same and different constant (fixed) rates.
6. Apply measurement to describe the real world and to solve problems.	--Conduct simulation and measurement for several aircraft conflict problems.

Strand III. Data Analysis and Statistics

Content Standard 1: Students collect and explore data, organize data into a useful form, and develop skill in representing and reading data displayed in different formats. (Collection, Organization and Presentation of Data)

Benchmark	*FlyBy Math*TM Activities
1. Collect and explore data through observation, measurement, surveys, sampling techniques and simulations.	--Conduct simulation and measurement for several aircraft conflict problems.
2 Organize data using tables, charts, graphs, spreadsheets and data bases.	--Represent distance, rate, and time data using tables, line plots, bar graphs, and line graphs.
3. Present data using the most appropriate representation and give a rationale for their choice; show how certain representations may skew the data or bias the presentation.	--Choose among tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.

Content Standard 2: Students examine data and describe characteristics of a distribution, relate data to the situation from which they arose, and use data to answer questions convincingly and persuasively. (Description and Interpretation)

Benchmark	*FlyBy Math*^{TM} Activities
1. Critically read data from tables, charts or graphs and explain the source of the data and what the data represent.	--Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.
3. Use the data and their characteristics to draw and support conclusions.	--Use tables, bar graphs, line graphs, equations, and a Cartesian coordinate system to draw conclusions.
5. Formulate questions and problems and gather and interpret data to answer those questions.	--Apply mathematics to predict and analyze aircraft conflicts and validate through experimentation. --Conduct simulation and measurement for several aircraft conflict problems.

Content Standard 3: Students draw defensible inferences about unknown outcomes, make predictions, and identify the degree of confidence they have in their predictions. (Inference and Prediction)

Benchmark	*FlyBy Math*^{TM} Activities
3. Formulate and communicate arguments and conclusions based on data and evaluate their arguments and those of others.	--Predict outcomes and explain results of mathematical models and experiments.
4. Make predictions and decisions based on data, including interpolations and extrapolations.	--Apply mathematics to predict and analyze aircraft conflicts and validate through experimentation. --Predict outcomes and explain results of mathematical models and experiments.
5. Employ investigations, mathematical models, and simulations to make inferences and predictions to answer questions and solve problems.	--Apply mathematics to predict and analyze aircraft conflicts and validate through experimentation. --Conduct simulation and measurement for several aircraft conflict problems.

Strand IV. Number Sense and Numeration

Content Standard 2: Students recognize that numbers are used in different ways such as counting, measuring, ordering and estimating, understand and produce multiple representations of a number, and translate among equivalent representations. (Representation and Uses of Numbers)

Benchmark	*FlyBy Math*^{TM} Activities
4. Apply estimation in increasingly complex situations.	--Predict outcomes and explain results of mathematical models and experiments.

Content Standard 3: Students investigate relationships such as equality, inequality, inverses, factors and multiples, and represent and compare very large and very small numbers. (Number Relationships	
Benchmark	***FlyBy Math*^{TM} Activities**
2. Express numerical comparisons as ratios and rates.	--Represent distance, speed, and time relationship for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system. --Use graphs to compare airspace scenarios for both the same and different starting conditions and the same and different constant (fixed) rates.

Strand V. Numerical and Algebraic Operations and Analytical Thinking	
Content Standard 2: Students analyze problems to determine an appropriate process for solution, and use algebraic notations to model or represent problems. (Algebraic and Analytic Thinking)	
Benchmark	***FlyBy Math*^{TM} Activities**
2. Represent algebraic concepts and relationships with matrices, spreadsheets, diagrams, graphs, tables, physical models, vectors, equations and inequalities; and translate among the various representations.	--Represent distance, speed, and time relationship for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system.
4. Analyze problems that can be modeled by functions, determine strategies for solving the problems and evaluate the adequacy of the solutions in the context of the problems.	--Explain and justify solutions regarding the motion of two airplanes using the results of plotting points on a schematic of a jet route, on a vertical line graph, and on a Cartesian coordinate system.
5. Explore problems that reflect the contemporary uses of mathematics in significant contexts and use the power of technology and algebraic and analytic reasoning to experience the ways mathematics is used in society.	--Apply mathematics to predict and analyze aircraft conflicts and validate through experimentation.